

**CORK INSTITUTE OF TECHNOLOGY
INSTITIÚID TEICNEOLAÍOCHTA CHORCAÍ**

Autumn Examinations 2015-2016

Module Title: Immunoanalysis

Module Code: BIOT6002

School: Science

**Programme Title: BSc in Applied Biosciences & Biotechnology
BSc (Honours) in Pharmaceutical Biotechnology
BSc (Honours) in Nutrition & Health Science
BSc (Honours) in Herbal Science**

**Programme Code: SBIOS_7_Y2
SPHBI_8_Y2
SNHSC_8_Y2
SHERB_8_Y2**

**External Examiner(s): Dr Brendan O'Donnell
Internal Examiner(s): Anne Ward**

Instructions: Answer FOUR questions only. All questions carry equal marks

Duration: 2hr

Sitting: Autumn 2016

Requirements for this examination:

Note to Candidates: Please check the Programme Title and the Module Title to ensure that you have received the correct examination paper.
If in doubt please contact an Invigilator.

Q1. (a) Explain briefly the principle of purification of IgG using saturated ammonium sulphate (5 marks)

(b) From the set of data below, generated from an experiment for the purification of IgG using ammonium sulphate calculate the following:

(i) Dilution factor for treated and untreated serum (8 marks)

(ii) The total protein concentration in the treated and untreated serum using the Beer-Lambert Law ($\epsilon = 0.8 \text{ (mg/ml)}^{-1}\text{cm}^{-1}$) (7 marks)

<i>Sample</i>	<i>Volume PBS (ml)</i>	<i>Volume sample (ml)</i>	<i>Abs_{280nm}</i>
Untreated serum	1.980	0.02	0.23
Ammonium sulphate treated serum	1.332	0.668	0.61

(iii) What conclusion can you draw from the experimental results? (5 marks)

Q2. (a) Illustrate the structure of IgG (8 marks)

(b) Define each of the following:

(i) Paratope (3 marks)

(ii) Epitope (3 marks)

(iii) Polyclonal Antibody (3 marks)

(iv) Monoclonal Antibody (3 marks)

(c) Explain the action of pepsin and papain on the IgG molecule (5 marks)

Q3. (a) Outline the technique used in the Ouchterlony Assay (8 marks)

(b) Explain the principle of **either:**

(i) SRID

(ii) Rocket Immuno-electrophoresis (8 marks)

(c) Illustrate and describe the principle of Immuno-affinity chromatography (9 marks)

- Q4. (a) Draw a diagram illustrating the principle of a non-competitive sandwich ELISA (12 marks)
- (b) What label could be used in this type of assay? (5 marks)
- (c) Draw an example of the calibration curve typical of this type of immunoassay (8 marks)

Q5. (a) Define each of the following:

- (i) Precision (6 marks)
- (ii) Accuracy (6 marks)
- (b) What other parameters would typically be examined in an immunoassay validation study? (6 marks)
- (c) Outline how you would optimise a typical immunoassay (7 marks)

Q6. (a) Write an overview of an Internal Quality Control (IQC) system under the following headings:

- (i) Basic IQC statistics (6 marks)
- (ii) Control charts (7 marks)
- (b) In Good Laboratory Practice (GLP) sources of error must be identified and eliminated to achieve a reliable assay.
- Outline the main sources of error associated with analytical methods (12 marks)